

The fillings of the present invention can be used with any suitable substrate; alternatively, the fillings can be used as a stand-alone food item. Preferred substrates include base cakes, which can be used to form sandwich biscuits. The sandwich biscuits remain intact during processing and shipment such as to minimize misaligned, smeared, split, or decapped products. These sandwich biscuits are especially suitable for being packaged randomly into bags. When subjected to the Vibration Test (set forth in the analytical methods section herein), the sandwich biscuits experience less than about 20% separation.

DETAILED DESCRIPTION

A. DEFINITIONS

As used herein, "lipid-based filling" includes any filling comprising at least about 20% lipid.

As used herein, "reduced fat" means at least about 20% less digestible fat than a comparable full-fat lipid-based filling.

As used herein, "low moisture" means a water activity of less than about 0.6.

As used herein, "added lipid" refers to lipid which is added over and above that amount inherently present in the other ingredients.

As used herein, the term "lipid" refers to edible fatty substances in a general sense, including natural or synthetic fats and oils consisting essentially of triglycerides, such as, for example soybean oil, corn oil, cottonseed oil, sunflower oil, palm oil, coconut oil, canola oil, fish oil, lard and tallow, which may have been partially or completely hydrogenated or modified otherwise, as well as non-toxic fatty materials having properties similar to triglycerides, herein referred to as non-digestible fats, which materials may be partially or fully indigestible. Reduced calorie fats and edible non-digestible fats, oils or fat substitutes are also included in the term. Mixed triglycerides made from medium and long chain saturated and/or unsaturated fatty acids are also included in the term. See, for example, U.S. Patent 5,288,512 to Seiden. Oils that contain medium chain triglycerides can also be used. See, e.g., U.S. Patent No. 4,863,753 to Hunter et al. Other oils which may be used include a triacylglycerol oil such as liquid Salatrim™ oil (sold under the trade name Benefat™ III by Cultor Food Science, New York, New York).

The term "non-digestible fat" refers to those edible fatty materials that are partially or totally indigestible, e.g., polyol fatty acid polyesters, such as OLEAN™.

While this invention will be generally described in terms of Olestra, it should be readily apparent that other fat substitutes or mixtures thereof could also be utilized in, and are contemplated by, this invention. Mixtures of fats and fat substitutes are also contemplated herein.

By "polyol" is meant a polyhydric alcohol containing at least 4, preferably from 4 to 11 hydroxyl groups. Polyols include sugars (i.e., monosaccharides, disaccharides, and

trisaccharides), sugar alcohols, other sugar derivatives (i.e., alkyl glucosides), polyglycerols such as diglycerol and triglycerol, pentaerythritol, sugar ethers such as sorbitan and polyvinyl alcohols. Specific examples of suitable sugars, sugar alcohols and sugar derivatives include xylose, arabinose, ribose, xylitol, erythritol, glucose, methyl glucoside, mannose, galactose, fructose, sorbitol, maltose, lactose, sucrose, raffinose, and maltotriose.

By "polyol fatty acid polyester" is meant a polyol having at least 4 fatty acid ester groups. Polyol fatty acid esters that contain 3 or less fatty acid ester groups are generally digested in, and the products of digestion are absorbed from, the intestinal tract much in the manner of ordinary triglyceride fats or oils, whereas those polyol fatty acid esters containing 4 or more fatty acid ester groups are substantially non-digestible and consequently non-absorbable by the human body. It is not necessary that all of the hydroxyl groups of the polyol be esterified, but it is preferable that disaccharide molecules contain no more than 3 unesterified hydroxyl groups for the purpose of being non-digestible. Typically, substantially all, e.g., at least about 85%, of the hydroxyl groups of the polyol are esterified. In the case of sucrose polyesters, typically from about 7 to 8 of the hydroxyl groups of the polyol are esterified.

The polyol fatty acid esters typically contain fatty acid radicals typically having at least 4 carbon atoms and up to 26 carbon atoms. These fatty acid radicals can be derived from naturally occurring or synthetic fatty acids. The fatty acid radicals can be saturated or unsaturated, including positional or geometric isomers, e.g., cis- or trans- isomers, and can be the same for all ester groups, or can be mixtures of different fatty acids.

Liquid non-digestible oils are also included in the term "lipid." Liquid non-digestible oils have a complete melting point below about 37°C include liquid polyol fatty acid polyesters (see Jandacek; U.S. Patent 4,005,195; issued January 25, 1977); liquid esters of tricarballic acids (see Hamm; U.S. Patent 4,508,746; issued April 2, 1985); liquid diesters of dicarboxylic acids such as derivatives of malonic and succinic acid (see Fulcher; U.S. Patent 4,582,927; issued April 15, 1986); liquid triglycerides of alpha-branched chain carboxylic acids (see Whyte; U.S. Patent 3,579,548; issued May 18, 1971); liquid ethers and ether esters containing the neopentyl moiety (see Minich; U.S. Patent 2,962,419; issued Nov. 29, 1960); liquid fatty polyethers of polyglycerol (See Hunter et al; U.S. Patent 3,932,532; issued Jan. 13, 1976); liquid alkyl glycoside fatty acid polyesters (see Meyer et al; U.S. Patent 4,840,815; issued June 20, 1989); liquid polyesters of two ether linked hydroxypolycarboxylic acids (e.g., citric or isocitric acid) (see Huhn et al; U.S. Patent 4,888,195; issued December 19, 1988); various liquid esterified alkoxylated polyols including liquid esters of epoxide-extended polyols such as liquid esterified propoxylated glycerins (see White et al; U.S. Patent 4,861,613; issued August 29, 1989; Cooper et al; U.S. Patent 5,399,729; issued March 21, 1995; Mazurek; U.S. Patent 5,589,217; issued December 31, 1996; and Mazurek; U.S. Patent 5,597,605; issued

January 28, 1997); liquid esterified ethoxylated sugar and sugar alcohol esters (see Ennis et al; U.S. Patent 5,077,073); liquid esterified ethoxylated alkyl glycosides (see Ennis et al; U.S. Patent 5,059,443, issued October 22, 1991); liquid esterified alkoxyated polysaccharides (see Cooper; U.S. Patent 5,273,772; issued December 28, 1993); liquid
 5 linked esterified alkoxyated polyols (see Ferenz; U.S. Patent 5,427,815; issued June 27, 1995 and Ferenz et al; U.S. Patent 5,374,446; issued December 20, 1994); liquid esterified polyoxyalkylene block copolymers (see Cooper; U.S. Patent 5,308,634; issued May 3, 1994); liquid esterified polyethers containing ring-opened oxolane units (see Cooper; U.S. Patent 5,389,392; issued February 14, 1995); liquid alkoxyated polyglycerol polyesters
 10 (see Harris; U.S. Patent 5,399,371; issued March 21, 1995); liquid partially esterified polysaccharides (see White; U.S. Patent 4,959,466; issued September 25, 1990); as well as liquid polydimethyl siloxanes (e.g., Fluid Silicones available from Dow Corning). All of the foregoing patents relating to the liquid nondigestible oil component are incorporated herein by reference. Solid non-digestible fats or other solid materials can be added to the
 15 liquid non-digestible oils to prevent passive oil loss. Particularly preferred non-digestible fat compositions include those described in U.S. 5,490,995 issued to Corrigan, 1996, U.S. 5,480,667 issued to Corrigan et al, 1996, U.S. 5,451,416 issued to Johnston et al, 1995 and U.S. 5,422,131 issued to Elsen et al, 1995. U.S. 5,419,925 issued to Seiden et al, 1995 describes mixtures of reduced calorie triglycerides and polyol polyesters that can be used
 20 herein but provides more digestible fat than is typically preferred.

The preferred non-digestible fats are fatty materials having properties similar to triglycerides such as sucrose polyesters. OLEANTM, a preferred non-digestible fat, is made by The Procter and Gamble Company. These preferred non-digestible fat are described in Young; et al., U.S. Patent 5,085,884, issued February 4, 1992, and U. S. Pat.
 25 5,422,131, issued June 6, 1995 to Elsen et al.

All percentages are by weight unless otherwise specified.

B. LIPID-BASED FILLING

As used herein, "lipid-based filling" includes any filling comprising at least about
 30 20% lipid. Preferably, the principal lipid component is a non-digestible fat. The fillings of this invention typically have an added lipid component making up from about 20% to about 40% of the total filling composition. The preferred fillings are of a low moisture content to promote shelf stability. The lipid-based fillings have a water activity (Aw) of less than about 0.6.

The fillings of the present invention also comprise a fully or partially saturated lipid ("crystallizing lipid"), preferably a triglyceride.

The inclusion of a sucrose polyester non-digestible fat allows for a reduced fat, reduced calorie product that has improved mouthfeel and flavor versus other lowfat filled biscuits. In comparison, many lowfat filled biscuits use high levels of polyols, emulsifiers,
 40 fillers, or moisture to achieve fat reduction. High moisture contributes to microbial